

AMERICAN INTELLIGENCE.

ORIGINAL COMMUNICATIONS.

Medico-legal Evidence of Independent Life in a New-born Child. By J. B. GASTON, M.D., of Montgomery, Ala.

The present status of medico-legal opinion in regard to the signs of independent life in a new-born child, is shown by the testimony of medical experts, and the judgments of courts, both American¹ and English,² in two law cases which involved the statutory descent of large amounts of property.

It appears that both English and American courts agree that the beating of the heart of a new-born child, after the severance of the umbilical cord, is conclusive of the independent extra-uterine life of the child. This judgment of the courts depends upon the testimony of medical experts, and it is therefore clearly within the province of medical criticism to inquire whether the decision is or is not consistent with a just interpretation of the phenomena of organic and animal life.

Of the great functions of organic life, respiration and circulation appear to be the conditions most unremittingly essential to the life of the higher orders of animals. Respiration, which, in general terms, is the evolution of carbonic acid from the fluids of organized beings and the absorption of oxygen from the surrounding medium, exists alike in the vegetable and animal kingdoms. All plants and all animals perform essentially the same respiratory function. It is an essential of organic life. (See Carpenter's *Circulation, Compar. Phys.*, pp. 253, 298.) The contrary is not an essential of organic life. The simplest organisms, both animal and vegetable, have no circulation whatever. Every part of their surface being equally capable of absorbing liquid nutriment, there is no necessity for a circulation.

Medical gentlemen, in testifying that the beating of the heart after the severance of the umbilical cord is conclusive of the independent extra-uterine life of the child, have overlooked that function, respiration, which is always and everywhere essential to organic life, and have given undue

¹ A full account of this case, tried in Delaware, will be found in the *Monthly Abstract of Medical Science*, for July, 1875, p. 333.

² The following is an abstract of this case: "A case of great interest in medical jurisprudence (case of *Brock v. Kellock*) has recently been decided by the Vice-Chancellor, Sir J. Stuart. The point at issue was to determine the legal evidence of life in an infant. Dr. Robert Lee and Dr. F. H. Ramsbotham contended that the proof of respiration having been performed was necessary to establish the fact of extra-uterine life. Dr. Tyler Smith, Dr. Freeman, and Dr. Alfred Taylor deposed that the continuance of the heart's action after severing of the umbilical cord must be accepted as proof of independent life. The Vice-Chancellor, in his decision, confirmed Dr. Tyler Smith's view of the case, and expressed his surprise that a man in Dr. Lee's position should have made such an affidavit. There was a large pecuniary amount involved in the decision. The case is of great importance, as it will serve to establish the law, which has been much unsettled upon the point at issue."

importance to a function which is not an essential of organic life, and which is found only amongst plants and animals of a somewhat complex differentiation of organs. That heart-beat is an essential of extra-uterine human life, of course no one will deny; but I do deny that it is *the essential* upon the presence of which can be predicated independent extra-uterine life.

High medical authorities—Drs. Penrose, Page, and others of this country, and Drs. Tyler Smith, Freeman, and Alfred Taylor of England—tell us “that the continuance of the heart’s action after severing of the umbilical cord must be accepted as proof of independent life.” The fact is, however, that intra-uterine life, so far as heart-beat is concerned, is just as independent of the mother as extra-uterine life. The *fœtus* is dependent upon its mother not for heart-beat and circulation, but for oxygen and nutrient materials. The *fœtal* heart-beat and circulation, as such, are as independent and distinct as the adult heart-beat and circulation. Not so with respiration. For the performance of this function the *fœtus* is entirely dependent upon its relations with its mother. Of the great organic functions, the suspension of any one of which would place life in immediate and imminent danger, none is so differentially characteristic of *fœtal* life as placental respiration. Destroy it, and intra-uterine life must end. What placental respiration is to the *fœtus*, pulmonary respiration is to the infant. When the former ceases, an essential of intra-uterine life ends. When the latter is established, a *sine qua non* of extra-uterine life has been supplied. Heart-beat and respiration are such absolute essentials of advanced *fœtal* and extra-uterine life, and death follows so suddenly and surely the destruction of either of these functions, that I conceive the true doctrine to be that no child can be known to be alive in which either circulation or respiration has been destroyed; and consequently since birth involves the speedy destruction of placental respiration, that independent extra-uterine life cannot be affirmed of an infant which has not breathed. Heart-beat is essential to both intra-uterine and extra-uterine life, but it is not characteristic of either. So it is with respiration; but placental respiration is characteristic of intra-uterine life, and pulmonary respiration is characteristic of extra-uterine life. At birth no sign can be conclusive of independent extra-uterine life which is not characteristic of extra-uterine life. But does not division of the cord give to heart-beat a characteristic and independent function which it did not possess before? I think not. If from a railroad train in rapid motion the engine should be detached, would not the brief, continued motion of the train be entirely dependent upon its recent relations to the engine? Division of the cord cuts off, so far as the mother is concerned, a further supply of conditions of life; but it does not give independence of life. I hold that the phenomena observed in the children mentioned in the Delaware and English law cases, if they were, and so far as they were signs of life, were in the same measure dependent upon recent relations to the mothers, as were similar signs before division of the cords.

In the children above mentioned, and in all like cases, there is good reason to believe that the heart’s action should not be relied upon as a strictly test sign of animal life. The first of the permanent organs of the embryo to display functional activity, the heart, pulsates while its walls are still in a cellular condition, before the formation of its own muscular tissue, or the development of nerve tissue either in its own substance or in the body at large. It beats through life so constantly, and so regularly, that we can

almost "count time by heart-throbs;" and physiologists, however they may differ as to the theory, agree as to the fact that it may continue to beat after death. Nay more, Mr. Todd has shown, contrary to what might be expected, that this power of rhythmical contraction after death is especially persistent in very young animals. The independence of the heart's action has been demonstrated by numerous experiments. In some cold-blooded animals it will continue to beat for many hours after its removal from the body. This is easily demonstrated with the hearts of the frog and the turtle; and Dr. Mitchell (*Amer. Journ.*, vol. vii. p. 58) states that the heart of a sturgeon, which had been removed from the body, continued its rhythmical movements until the auricle had become so dry that a rustling sound was heard with each contraction.

The life of a new-born child rests very largely upon the action of the heart. It is probably the most constantly essential of the supports of the "tripod of life." The *independence* of extra-uterine life rests, however, neither upon the beating of the heart, nor upon the division of the cord, nor upon both of them together, but upon the substitution of the extra-uterine conditions of a great organic function constantly essential to life, for the foetal conditions of the same function which have been, or are about to be destroyed. Pulmonary respiration substitutes real, tangible conditions of independence for those of dependence; and until it is established there can be no "independent life."

We have seen that heart-beat, although essential to, is not characteristic of extra-uterine life, and consequently does not attach to it any feature or condition of independence which did not belong to foetal life; that division of the umbilical cord may destroy conditions of foetal life, but that it is not in any sense a factor, sign, or condition of independent extra-uterine life; and finally, that beating of the heart, of itself, will not do for a test sign of life in the animal to which it belongs. It, therefore appears that the phenomenon, "continuance of the heart's action after severing of the umbilical cord," to which, in the afore-mentioned cases, medical experts and courts have attached so much importance, was not evidence of "independent life," but was probably simply the last flickering of an extinct foetal life.

Of what life is in itself, that is apart from its manifestations, we philosophically know nothing. All our knowledge of life is purely phenomenal. It is, therefore, in the present state of science, impossible to draw the line and mark accurately where dependence ceases and independence begins. I have endeavoured, therefore, simply to establish a practical distinction based upon some of the differential phenomena of foetal and extra-uterine life. What is false in science cannot be a fact in law; and although legislative bodies may yet declare the presence of circulation and pulmonary respiration, in some extreme cases, such as deliveries at non-viable ages, too narrow a base upon which to establish the civil rights of infants, I feel assured, that before long the courts must hold that less than this is not, in any case, sufficiently broad.

November 15, 1875.

Rupture of Uterus at full Term; Child, Placenta, and Appendages emptied into Peritoneal Cavity; Delivery by Version through Natural Outlet; Death after sixty hours. By JOHN W. OGILVIE, M.D., of Allendale, S. C.

The subject of this accident, Mary A., was a well-developed and rather obese negress, of about 35 years of age; sixth pregnancy. She was